CAM

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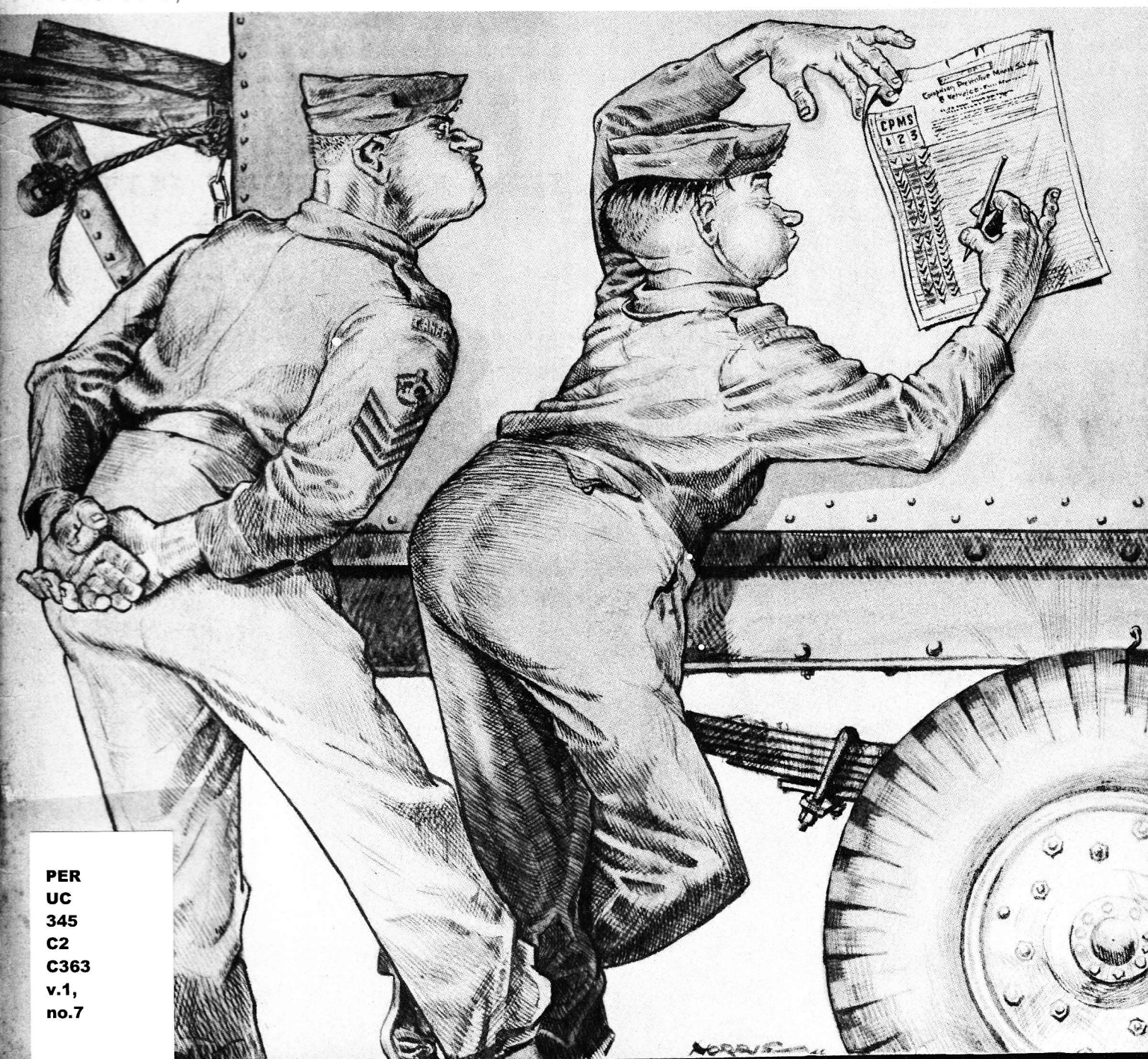

VOLUME 1 NUMBER 7 APRIL 1944

A letter from the M.G.O.

CAM

APRIL – 1944
VOL. 1 No. 7

DEPARTMENT OF NATIONAL DEFENCE
ARMY

OTTAWA, CANADA,

8 March 1944.

TO THE MEN AND WOMEN OF THE CANADIAN ARMY

In the first issue I had the pleasure of writing a few words of introduction for this rather unconventional publication CAM.

At that time I expressed the hope that CAM would prove of value in getting items of technical instruction and interest to you in the field.

From reports reaching my office, not only from Canadian districts, but from many operational theatres in which British troops are active, the enthusiastic reaction to the first six issues has fully borne out my hopes in this regard and it has been my pleasure to authorise a substantially larger circulation and an increase in the number of pages. This has enabled the editors to incorporate material on Armament and Telecommunications and further broaden the scope of the magazine.

In the light of these things we can no longer regard CAM as an experimental oddity, but as a proven medium for presenting the facts of good maintenance. It now remains for you to carry out the spirit of conscientious maintenance by applying these facts in a practical way-and in addition, by contributing your ideas and suggestions to this magazine.

By sending in to CAM your practical ideas from the field, which after all, is our best testing ground, you will be making the fullest use of your magazine-and contributing in no small measure to the better maintenance of Canada's War equipment.

James V Young.

(J. V. Young) Major-General,
Master-General of the Ordnance.

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CAM is published monthly in the interests of Mechanical Maintenance, and directed to the non-commissioned officers and men of the Canadian Army.

Your contributions of articles and ideas are welcome. Address all correspondence to the Editor, CAM, Directorate of Mechanical Maintenance, Department of National Defence, Ottawa.

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The Carburetor

FINISHING UP AN ARTICLE WE STARTED LAST MONTH . . .

There's nothing that can happen to an engine that can't be blamed on the carburetor, be it a fouled plug or a thrown con-rod. Everybody knows there's a carburetor under the hood, that its a busy little B, and that it's the direct cause of everything.

Because of this common knowledge, the carburetor has a snowballs chance in hell when anything goes haywire. And the funny thing is that despite all the attention it gets, a clear majority of the guys who work on carburetors don't always know just exactly what they're doing.

If they can demolish it and then get it back together without having more than four parts left over they figure they're experts.

But taking a carb apart and putting it together—even with no parts left over—is only half the battle. If the carburetor is really understood, as often as not it wont even be touched when engine trouble develops, and when trouble is actually traced to it the righteous mechanic will know what to look for when he tears into it.

Which fact, in a peanut shell, is why we were so busy in last month's issue building up a carburetor from a tea kettle and assorted home plumbing—Not to have every Joe who has fixed the sink at home start workin' on them—not even to give the impression that a carb isn't a precision instrument—but to prove that it is—more of a precision instrument, in fact, than a ladies wristwatch—and in addition to put over the main principles that all carburetors work on. Of course not all carburetors get results in exactly the same way. But you can figure out almost any of them, if you understand what a carburetors' job is and how it does it.

The easiest way to learn about carburetors is to consider—and work on them—in Circuits. Frinstance, there's the float circuit, the high speed circuit and idling circuit like we told you about last month. They're a sort of basic set-up and to illustrate them we used such homey things as a water closet and kettle for the float circuit, the spout of the kettle was our high-speed circuit, a fly spray demonstrated the principles of the idle circuit. With this simple set-up our engine operated—but in a crude sort of way. We haven't reached the refined standard of the carburetor on our army vehicle—we lack power on hills and we're eating up gas like it was free.

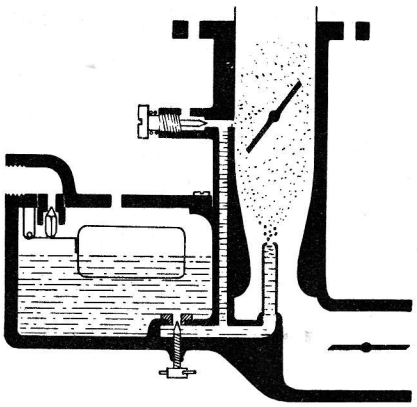


Fig. 1

This latter fact no doubt consumed the time and energy of many engineers who's names started with Mac and resulted in the addition of a tap to regulate the amount of fuel going into the engine for ordinary driving (Fig. 1)

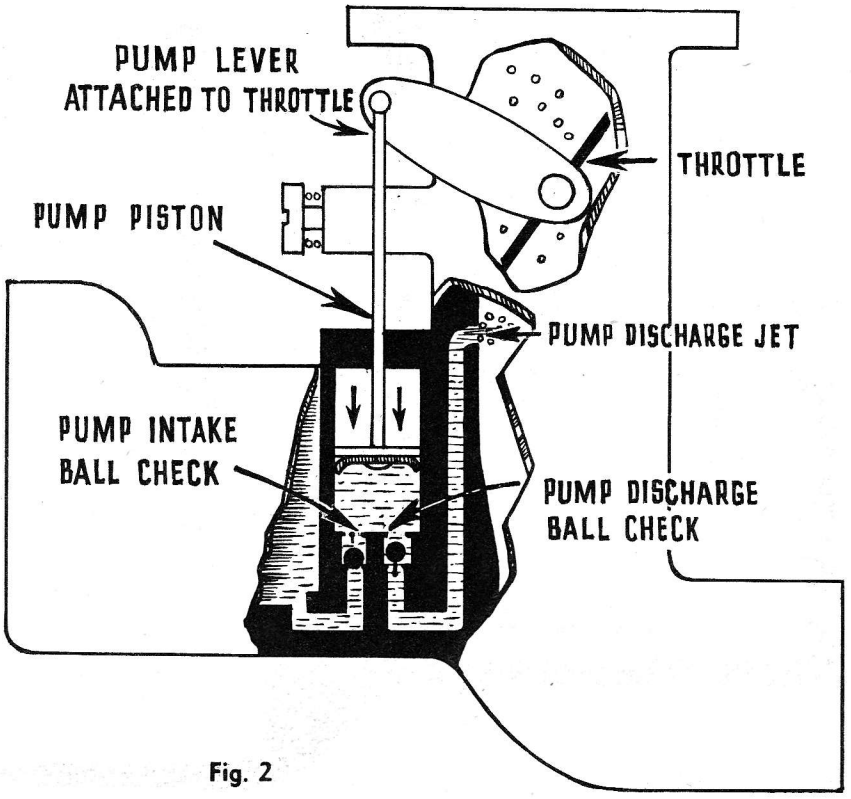


Fig. 2

However in test running the tap (the manuals call it a metering jet) our Mac's found it very much of a bore, bother and business to be continually climbing along to the carburetor to adjust the tap to meet different driving conditions. Everytime a hill was encountered the tap had to be opened or the engine didn't receive sufficient fuel—and the acceleration was very poor due to the stingy amount of fuel allowed to pass through the partially closed tap that the Mac's had installed.

Some means of getting extra fuel to the engine—only on the occasions where it was **needed**—without disturbing the economical setting of our tap (or metering jet) was necessary.

Say you're driving along at 30 m.p.h. and the throttle door is open just enough to keep the engine running at that speed—then you want to go 45 so you whack the throttle wide open and a heck of a gust of air blows up the pipe into the engine—the regular main jet can't supply the fuel fast enough—so we've got a lean mixture and the engine just lays down.

Just a squirt of gas would do the trick—get us that extra fuel to give the engine a pick-me-up on acceleration.

To get that squirt we need a pump and to get it to work at the proper time all we have to do is hook it to the throttle. That way, when the throttle is opened we get a pumping action and gasoline is squirted into the carburetor throat to mix with this gust of air and presto—we get a richer mixture to give us the extra power necessary for acceleration. (Fig. 2) Now that we've got out accelerating 'boost' Mac hasn't had to climb out and touch the tap—everyone is happy.

But comes the snag. The 'squirt' doesn't last long and we're in a hurry and want to keep going at 45. We're back working off our stingy metering jet—the engine once more begins to go hungry.

We can supply extra fuel by continually pumping the accelerator but aside from making our leg tired this is "pedal patting"—a bad business that wastes more gas than you can shake a dip stick at.

What we need now—after the accelerator pump has given its squirt into the throat of the carburetor is just a little extra fuel all the time we're driving at high speed—or whenever the throttle is open beyond a certain point like when climbing a long hill or pulling a heavy load.

Again the throttle position is the clue—we only want our bit extra when it's open so why not use it to operate another route for gasoline to reach the engine—to add to that being supplied by the main jet. Take a look at Fig. 3 if this is not clearer than 4.4 beer and you'll see how the opening of the throttle brings this economizer jet (or step-up jet, as its sometimes called,) into play.

All of which gives us a workable carburetor from the standpoint of economy and power from idling speed to fast stepping. As we said before there are many different ways of getting the same results and every manufacturer doesn't make his carburetor to look like ours (which is probably just as well). Still, some fellows like blondes, some like redheads, some like brunettes,—carburetor manufacturers included,—and they carry these differences of opinion into their carburetors. Some use the vacuum in the engines' manifold to operate the high speed circuit instead of the throttle for instance. Some use fixed metering jets. Some like 'em adjustable (like our tap) But they're all trying to arrive at the same ideal—to get the correct amount of air and gasoline mixture into the combustion chamber to suit the requirements of the engine under all conditions consistent with the maximum of economy of fuel.

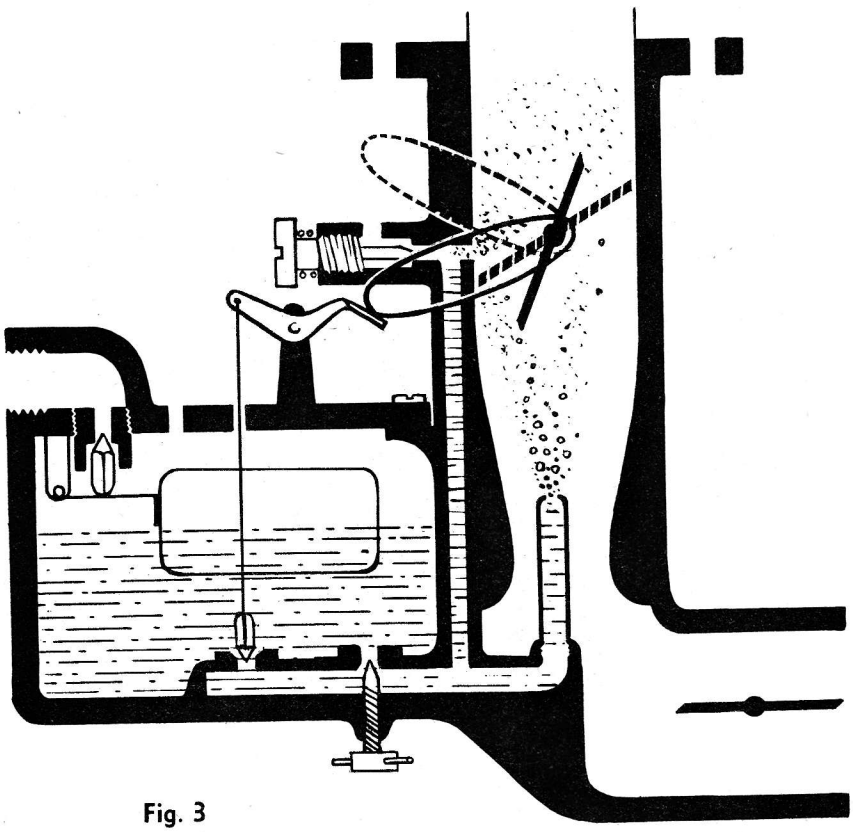


Fig. 3

Save Your Old Anti-Freeze

DINNA BE THROWIN' AWA' YER AULD ETHYLENE GLYCOL ANTI-FREEZE COME SUMMER—WE'RE SAVIN' IT AGIN THIS YEAR (HOOT MON, HOOT, HOOT)

Ethylene glycol (as in Prestone, Chryco, Shellzone etc.) is still very much on the shortage list and shouldn't be dumped down the sewer —Save it.

Now comes the chorus from the lads who say, "Well, if Ethylene glycol can be used over and over again, why not just leave it in the cooling system—why bother to take it out and store it?"

Because things happen—Ethylene glycol used for six months has to be purified and reinhibited before you can trust it again. Something new has got to be added. Impurities have got to be subtracted.

So pick yourself up out of that easy chair we're gonna drain our old anti-freeze.

First of all we'll need some clean cans, pails or spitoons to drain the stuff into. If you happen to have some 45 gallon oil drums or the tins that the stuff originally came in, they'll do fine—but whatever you use make sure it is clean. That means no oil, gas or dirt. Don't worry about mixing brands (Prestone, Shellzone and Chryco for instance) so long as they're all Ethylene glycol anti-freezes you can put them all together.

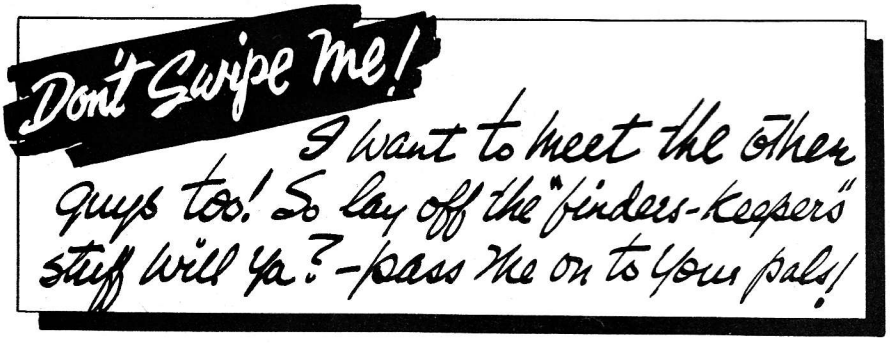
You'll get all kinds of colours and shades of anti-freeze out of them there rads—from nearly clear to rusty brown—that's O.K.—Save it all. Put it all in the pot. Maybe you haven't enough containers to hold all the stuff you drain out. O.K. Don't just toss it away before looking any further—instead grab up a phone and call up your local D.S. & T.O.—he'll get them for you or bust a pantie button trying. He'll also tell you where to send your anti-freeze and at the present time it will likely sound like this:

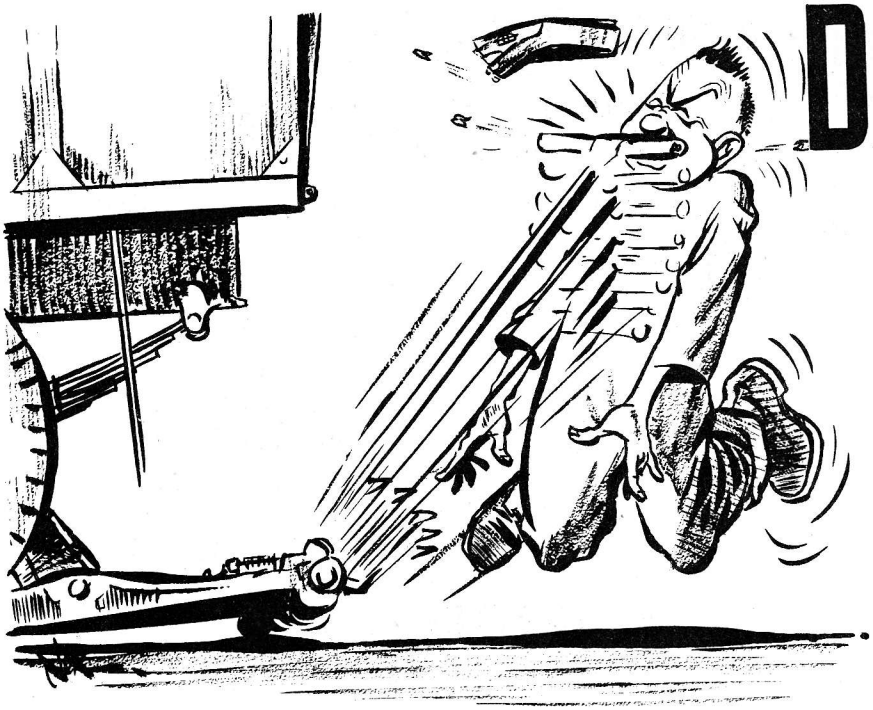
Toronto for M.D.1 and 2 and Camp Borden
C.M.T.S. Ottawa for M.D. 3 Petawawa and N.D.H.Q.
Quebec, P.Q. for M.D. 4 and 5
Debert, N.S. for M.D. 6
Sussex, N.B. for M.D. 7
Winnipeg, Man. M.D. 10
Regina, Sask. for M.D. 12
Calgary, Alta. for M.D. 11 and 13.

So now you've got a whole pile of anti-freeze canned up. Its up to you to get it to the District R.C.A.S.C. Company at the places listed above if you're stuck on the problem of transporting it the D.S. & T.O. will help you out again. Just remember that this is a co-operative effort to save as much of this scarce commodity as possible.

With your long nose you will probably want to know why the anti-freeze has to be reconditioned before it can be used again. In the first place the Inhibitor gets used up in service. When anti-freeze is put in the Cooling System of your vehicle the inhibitor in it spreads over the walls and surfaces of the cooling system like a protective blanket against rust and sludge, but in the course of time, depending on the kind of water put in the Cooling system (soft water is best) and the kind and amount of driving done, the Inhibitor gets used up. This can happen in about six months—from then on rust and sludge may start to gum up the works.

The purification and reinhibiting of anti-freeze requires special equipment so we won't tell you about it—seeing that we don't know anything about it anyway. But what we do want to tell you about is the necessity for you saving your old anti-freeze as the recovery of this will mean a lot less headaches for you when winter comes again.





DON'T LET

"Joe, Joe, Joe! Hey! Joe! Help!" Yep, you guessed it. The jack is slipping. Maybe you've heard that hair-raising holler from some victim who's been trapped under a vehicle when a jack has slipped. Well, take it from us, it's darned unpleasant to be lying under a vehicle and suddenly find a couple of tons or more of cold steel pressing down on your eye-glasses while you cogitate over just what you'll look like as a piece of wall paper. Of course, when they come down fast you're spared the cogitation part.

A grim picture? Could be— but then, maybe you've never before looked on a jack as a means to an end—your end. Maybe you've even been a bit disrespectful toward jacks in general; sort of taken them for granted just because they don't **look** dangerous.

Well normally a jack won't "let down" on you. **IF** you look after it and **IF** you use it properly. It's not the jack so much as the two **"IFs"** that will get you. Get rid of them, and you'll come to look upon your jack with a respectful and brotherly eye.

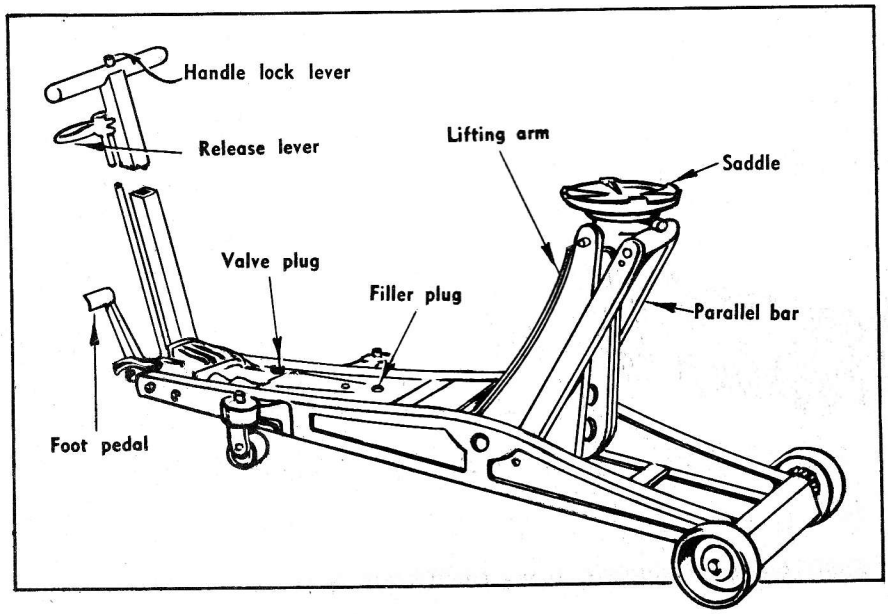
The Number One rule for looking after almost any piece of mechanical equipment is to keep it clean. Dirt can give you more trouble with a jack than bubble gum in your toupee.

Lubricate the working parts of your service jack regularly. That's what the oil holes are for in the base of the lifting arm, crosshead, handle pivot, foot pedal pivot and castors.

Keep packing gland nuts at the piston and pump plunger snug, but don't swing on them with an 18" stilson as they're not under high pressure and only need to be tight enough to prevent oil leakage.

Periodically you'll have to remove and inspect the ball valves. You can do this by removing the valve plug and turning the jack on its side. They'll roll out. Don't try to use the old valve plug gaskets again as you'll get oil leaks—install new ones.

Put this in bold type Mr. Printer USE ONLY THE CORRECT OIL IN HYDRAULIC JACKS. More jacks (and Joes) are ruined by using brake fluid, dirty old crank case oil and what-have-you, than any other cause. For your jack, the Canadian Army prescribes D.N.D. 38 and here's an important thing to remember. D.N.D. 38 is known as shock absorber oil light, but that doesn't mean you can slap in any shock absorber fluid. D.N.D. 38 is used in the piston type shocks and strictly between you, us and the temperance league is a straight mineral oil. D.N.D. 595 is a shock absorber fluid too, but don't use it or any other fluid that does,



"JACK" GIVE YOU THE SLIP!

or might, contain alcohol, glycerine or any other foreign agents that are likely to sabotage the leather washers, stick the ball valves and generally do no good.

Make sure it's properly filled too. Here's how for the service jack. See that the filler plug and surrounding area is clean. Remove filler plug and with the saddle **down,** pour in D.N.D. 38 oil until the level comes up to the "Full" mark on the dipstick that's attached to the filler plug. Don't put in any more for luck, as it will just squirt out the vent hole as the jack is raised. And don't forget what we said about keeping it clean. Dirt inside a jack, like crackers in a bed, makes nobody happy.

What about operating?

"Well, you just stick it under whatever you want to lift and pump the handle like you used to do on Uncle Snodgrass's farm. Nothing to it—if you don't care for life, limb or lucre. However, knowing that many of our dear readers are keenly interested in these things, here's some jack etiquette as recommended and culled from reliable sources.

Every jack has a rated capacity—that is, it's built to raise up a certain weight and no more. Overloading is one of the things that busts up jacks fast. So don't put a boy on a man's job. This is easily enough done by improperly placing the jack.

A light jack may be OK to lift a wheel but will be overloaded if placed under the differential or centre of the axle. Near the wheel it has to lift probably 40% of the total weight but when lifting one end of a vehicle, it has to raise 65% of the total weight of the vehicle.

Lifting the load on one prong or on the outer edge of the cap of the jack is another good way to make the insurance man pay off to your nearest relative. It doesn't do the cap and lifting arm any good either. You get the same undue strains on the jack by not keeping the jack vertical, or jacking up a vehicle on inclined floors or roadways.

Then there's the pumping handle. Two techniques are used here. One good, one bad. The "soda jerkers" technique is the bad one. The short choppy strokes that work so well for dishing up chocolate sodas are bad medicine for jacks as they cause a "bouncing load" which is about twice the normal load. Use a smooth, even stroke and your jack will work faster and last longer. You've seen guys let service jacks "whip" a load down. Next time you do, give 'em hell (if you have enough hooks) and point out that this trick puts double the strain on all operating parts because the load becomes a "bouncing load".

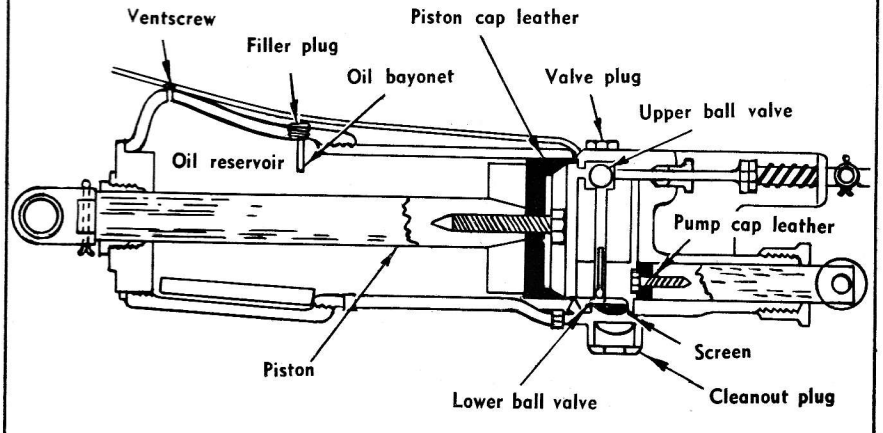
Then there's the "See-how-high-we-can-get-it" lads. More unnecessary strain on the jack's innards, and the higher the lift the greater the strain.

A jack isn't a block. So don't leave a jack holding the weight of a vehicle for long periods. Aside from tying the jack up so that no one else can use it, there's not much point in putting the wear and tear on an expensive piece of equipment when a good block of wood or a jack stand will do the job just as well and be a safer proposition.

Sometimes jacks give trouble, but you can usually track them down by the behaviour of the jack and the following is a short course on tracking. (The characters and names used are fictitious and any similarity between Jacks living or dead is entirely our fault)

JACK WILL NOT OPERATE

(a) **Dirty Valves**:—To empty jack, open the release and operate the jack in the regular way. Another way is to raise and lower the bell crank by grasping the cap. Do this



Xray Shot showing upper and lower ball valves, vent plug, screen (and other inner sanctum mysteries)

several times with the release open. Now flush thoroughly with kerosene, drain and refill with D.N.D. 38.

(b) **Release Valve Open**:—Make sure this closes tight when a load is being raised or is in a raised position. A chip or piece of dirt could wedge in the release valve seat and cause this trouble.

(c) **Sticky Valves**:—Using brake fluid or too thick oil will often cause sticky valves. A thorough flushing and a refill with proper fluid will fix 'em.

(d) **Air Bound**:—Air leaking into the clean out plug or a too low oil supply will cause this and the jack will work on only a half stroke of the handle. Fill the jack with oil, raise the saddle and then lower it while holding the foot pedal depressed. This will flush out any air in the system, and excess oil may run out the vent. Make sure its properly filled with oil before using again.

(e) **Dirt Plugged Screen**:—With lots of oil in the jack, you may pump like a six-day bicycle rider out to gain a lap and nothing happens. So remove the clean-out plug under the cylinder directly opposite the valve plug and clean the screen. Make sure the plug and gasket are on tight when you replace them.

JACK RAISES LOAD ON DOWN STROKE OF HANDLE and then settles back forcing up handle

(f) The upper ball valve is leaking—its most likely dirty or stuck so do as in (a) or (c).

JACK WILL NOT LIFT TO FULL HEIGHT

(g) Check oil level:—Most floor jacks are filled full. Service jacks usually have a dipstick on the filler plug for you to go by.

(h) **Vacuum Bound**:—This condition is due to lack of air in the reservoir and basically, the ball valves are being held on their seats by the vacuum created as oil is withdrawn from the reservoir. Fix this by being sure the vent is open to allow air into unit. If necessary the vent plug can be removed to let in enough air to correct this condition, and then replaced.

JACK WILL NOT HOLD A LOAD

(i) Leaky valves—See (a), (b) and (c)

JACK TRIPS JOE

(j) This catches Joe with his handle down—if he had elevated the handle he wouldn't have tripped over it and added another mark to the accident score for his workshop. When handles are left down on the floor, it's easy for a vehicle to run over them and do them a lot of no good.

JACK LIVES HAPPY EVER AFTER

(k) Which is just the way it should be.

There's Parts for them there Jacks....

When you overload a service jack what usually happens is cracked side plates. O.K. but don't add insult to injury by tossing the jack into the junk pile. The welding of fish plates onto the side is a good repair procedure and the jack can be returned to service as good as new. This principle applies to other parts of jacks. Too many fast fisted Joes are tossing good jacks into the discard just because of a part breakage. Maybe they don't know it, but spare parts can be obtained by submitting an indent to their ordnance officer.

Go get 'em before you write off an expensive piece of lifting equipment as junk.

Battery Facts

You tied up your cabin cruiser in the good old days B.S. (Before Schicklegruber) at the end of your summer cruising and went back to your paper route for the winter months. Then next summer you lightheartedly moved back to the summer estate ready for another few months of idle luxury—only to find a minor catastrophe awaiting you—your cruiser wont start—the battery is flat and shot: Even after you had gone to the trouble of hiring a graduate engineer to operate a hot water bottle all winter just to keep that battery warm and cosy.

Of course you knew that batteries gradually lose capacity when standing idle—the gravity becomes less and less and the plates become sulphated. But a little known fact is the way in which temperature has a marked effect upon self-discharge of a battery. At 80° F—which is considered an efficient temperature for a battery to work under—the self-discharge amounts to more than a 1 point loss in gravity per day—at 100° F it amounts to nearly 3 points loss per day. Yet at 0° F (Although the cranking power is only 50% of what it was at 80°) the loss is almost negligible.

Of course as the battery becomes aged from use the self-discharge tends to increase. Impurities introduced by using impure water also cause increased self-discharge.

Which all proves that it's a mistaken sense of tenderness and benevolence that prompts the laddie to store his battery next to the radiator or in a warm room. Keep it cool—and it won't be so prone to kick the bucket by discharging itself rapidly.

For B.F.s

THE STITCH IN TIME

"...he studied the innards of his men..."

An army, Napoleon once said, marches on its stomach; and, in this respect at any rate, Napoleon knew his onions. He knew that a soldier needs good meals and regular meals. Give him breakfast once a week, dinner once a month and tea when he's lucky, and he'll begin to feel neglected. He won't be able to stand up to hard work and long hours. His efficiency, as the night starvation advertisements have it, will be impaired.

Napoleon had no Chevs and Fords (or he might never have finished his days on St. Helena). If he had, we feel sure he'd have studied their innards as he studied the innards of his men. After all, a vehicle and a soldier have a lot in common. You've got to pour fuel into them before they'll do anything. You've got to look after them if you want them to give of their best. You've got to understand them and know how to treat them—and how often. Which at twenty cents a pint is a bit of a poser.

What we're getting at is that regular and conscientious care is every bit as important for the vehicle as it is for the driver. Learn to regard an instruction such as "top up once a week" in the same way as you regard "dinner once a day." DON'T MISS IT. Accept the fact that the maintenance recommendations in the instruction book are based on technical knowledge and years of experience, and carry them out to the letter.

This isn't just a fad or an excuse to make work for the driver. We KNOW that over 75 percent of the minor troubles which affect vehicle efficiency are due to neglect. OVER 75 PERCENT. And the day may come when someone will have to trust his life to his vehicle. That's a solemn thought for a light-hearted story, but it's better to be solemn now than sorry later.

Read your instruction books. Do as they tell you, and you won't go far wrong. Keep a watchful eye on such things as brake and clutch adjustment, and report when attention seems to be necessary. Top up the oil sumps and reservoirs regularly, and look out for traces of leakage if you have to put more oil in than usual.

Remember, oil and grease make it possible for a motor vehicle to run. An engine without oil can be wrecked in a run of three miles, and that, on a cost-per-mile basis, is more even than the Finance Minister can put up with for long.

We are in your hands. The makers of the vehicle cannot carry out routine maintenance for you any more than they can drain the radiator in cold weather or stand over you when you use the choke—much as they'd like to, with something heavy.

Make up your mind to take the care of your vehicle seriously. Look after it as you would like someone else to look after it if it belonged to you. Don't neglect ANYTHING, however small and unimportant it may seem. It's the small things as the soldier said when he turned his shirt inside out, that cause the trouble.

"...the same way you regard dinner once a day..."

Bogie Tires

It's one of those fine, warm spring days, Joe and Gus are hot footing down the road outside of camp on their way to town. From behind comes a roar and a Ram tank trundles by. Just after passing them there's a sharp bang and the tank pulls over to the side and stops.

"Sounded like a blowout", says Gus.

"Wadda ya mean"? says Joe, "that's a tank—not a truck".

"Still sounded just like a tire blowing to me", says Gus.

"How can a tire blow on a tank, you.....? "Well I'll be a....." By this time our argumentive friends had caught up with the tank and were just in time to have their argument settled by a member of the tank crew yelling down the turret hatch that one of the right bogie tires had "blown"

Of course, as any tank man will tell you, the solid tires on bogie wheels do blow out. If he was coaxed a bit he'd probably tell you a lot of other things you maybe didn't think of in regard to a tank's rubber.

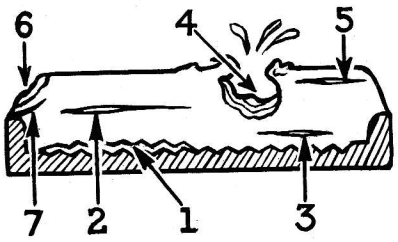


Fig. 1

TYPES OF FAILURE

1. **Separation from steel**
2. **Separation from pad**
3. **Separation from Union rubber**
4. **Blow out**
5. **Lamination on ply separation**
6. **Chipping**
7. **Undercut**

Take the way a tank eats up rubber—based on the average life of track pads and bogie tires, a medium tank uses up about two pounds of rubber every mile. You could erase a lot of pencil marks with two pounds of rubber—every mile.

What we want to know is—what's a fellow to do about it—rubber being as scarce as the conga in the old folks home. Well—if a fellow happens to be a tank driver, there's several things he can remember.

First of all, to ponder on the fact that a medium tank weighs better than 30 tons and has 12 rubber-tired bogies, produces with a minimum of mental effort, the fact that each little bogie normally carries 2½ tons —or about eight times as much as the tire on your family jallopy back home. Over rough going, the shock load on each bogie can be a good deal more than that.

This great pressure on the tire combined with its speed produces considerable heat and heat is an item which doesn't contribute anything to the comfort and happiness of solid tires.

Heat is what causes the blowout which starts with an air bubble formed inside the tire. A combination of friction and heat in this separation is capable of melting the surrounding rubber and building up enough pressure to blow—like a bubble in a porridge pot.

Everyone knows that an automobile tire that's out of line wears out very fast, due to the skidding action of the tire on the road. Not so many people realize that tank bogie tires can also suffer from this complaint. When the tank comes from the factory the sprockets, idlers and bogie wheels are all in line, but a tank's track and suspension doesn't usually lead the life of Riley and it is quite capable of getting out of line. A severe bump on an idler will put a track out of line. A 30 ton sock on a bogie can put it out of kilter too and either or both will give us a skidding action on the tires and rapid wear.

Now take a look at Fig. 2. This is what track end connectors can do to a bogie tire—given the chance.

They get the chance if the track is adjusted too loose. This lets the bogie wheels run up onto the end connectors and go to work on them

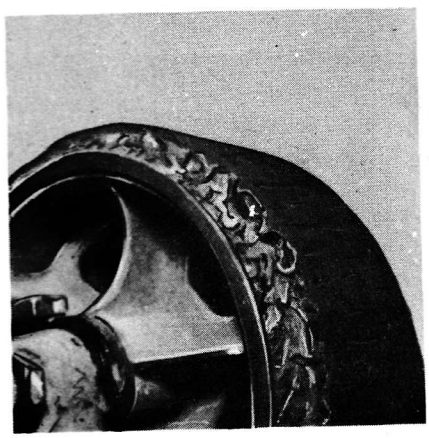


Fig. 2

like a stenographer on a package of double-mint. On the other hand, a track that's adjusted too tight not only puts extra strains on the track, suspension, transmission and engine but adds to the pressure on the tires increasing heat generation and wear.

Getting back to the chewing process, another quick method of removing rubber by means of the end connectors is by turning the tank

sharply on a slope. Besides putting terrific strains on the idler and bogie brackets (see March CAM, page 90), it also tends to make the bogie wheels ride up onto the end connectors.

Sometimes the rubber tire will start to separate from the metal rim. If this gets more than 1" (measuring in and under the separation) it's the time to get it repaired—before

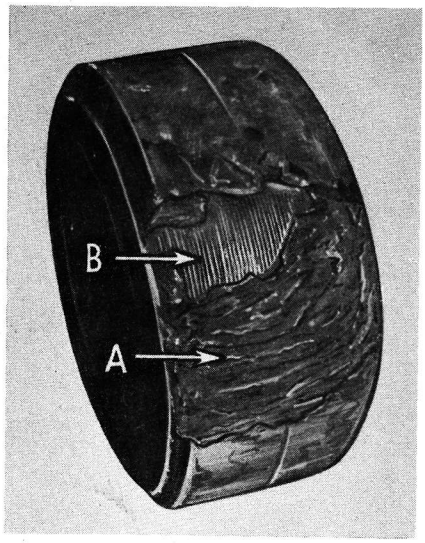


Fig. 3

grease, sand and the heat caused by friction does what you see in Fig. 3-A and the rubber just shears off level with the bead.

There's not much you can do to prevent stone cuts and tears on bogie tires but there's one thing you can do to save those tires and that is to keep an eye on those bogies, dig the stones out and never let a damaged tire remain on a vehicle until the bare metal starts to show.

A solid tire can be patched or recapped just like a regular pneumatic tire—if you catch it in time, but let it get anywhere near the stage shown in Fig. 3-B and it becomes a total loss. All the rubber must be stripped off and the tire completely rebuilt. A blowout calls for immediate removal and recapping. Stone cuts and end connector "chewing", when it gets to the stage where hunks of rubber start to break away and fly off is also the signal for removing the tire for a repair job. There are lots of other points that bear directly or indirectly on bogie wheel tire life. Bogie wheel bearings that are receiving insufficient lube generate heat which is transmitted through the metal wheel to the tire —or they may tend to bind, thereby causing a strain on the tire surface that causes cracks like in Fig. 4.

Too much lube in the wheel bearings or a leaking grease seal throws grease onto the track pads and tires. We don't have to tell you what grease does to rubber. You should clean the grease off the rubber by washing it off with varsol (or gasoline) but use it sparingly as it's not kind to rubber either. Then get after the cause of the grease throwing. Which all boils down to the fact that bogie wheel tires are vulnerable, scarce and costly, but can be repaired if you watch the signs, know what they mean and get the tires off the tank and into the repair shop.

Fig. 4

By which we mean you wont be wasting materials by changing your bogies before the job is necessary—and you wont be ruining them for reclamation by neglecting to change them as soon as necessary.

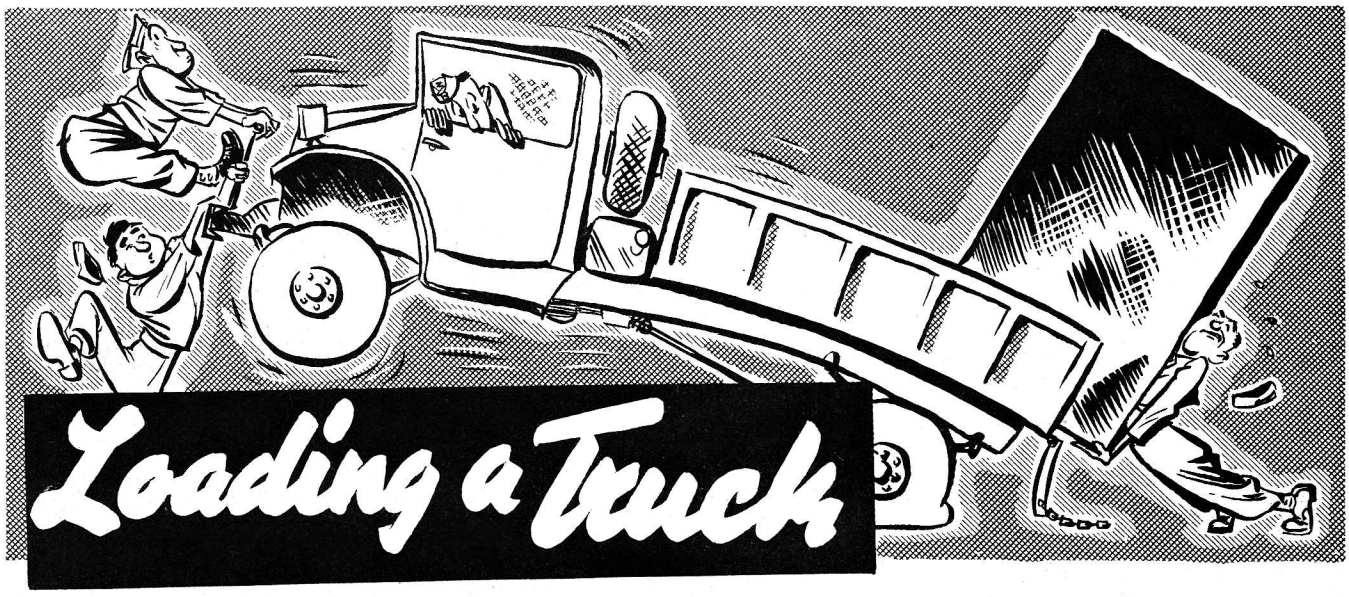
As Gus mentioned to Joe when they finally headed for town again. "A bogie tire can get into more trouble than chickens at a track meet."

Motorcycle Misfit

Often quoted—the first four words in particular by the female majority of our cities—is the old proverb "Show me a man who never made a mistake and I'll show you a man who never did anything". With this in mind, grab up a big blue pencil and the Canadian Army Modification Bulletin (Motorcycles H-1) entitled "Spring Rod Spacer Plate". Flick the bulletin over, exposing the backside containing the drawing of the spacer plate and taking the big blue pencil in your left or right hand only, cross out the demension 3-5/16" shown as the distance between the centres of the drilled holes, and inscribe 3-1/4" in its place. You have now corrected an error the easy way. If you've already made up these plates from the original bulletin and somehow got them onto the fork spring rods, you should now proceed to correct the error the harder but more important way by replacing them with new plates drilled to the new demensions.

In this connection, Lieutenant J. B. Nicholson of the motorcycle school at Barriefield comes up with a good suggestion. He points out that it's a good idea to check the spring rods for straightness as they are quite easily put out of line when a machine is spilled. Where spring rod bushings continually work out of place, it's usually found to be due to bent rods.

The spacer plate will increase the spring rods' rigidity and in practically every case overcome the tendency for the bushings to lift out, but where the rods are too badly out of line they should be replaced with new ones (Part No. 2631-36).



Loading a Truck

You may be a good driver—You may do your preventive maintenance carefully and well, but you can still be thrown for a loop by improper loading of the vehicle.

The idea that muscle meat is all that's needed to load a truck is only half the story.

Uncle Tafrail Splashpuss (our seafarin' uncle) could tell you that. He'll tell you he's seen a lot of ships loaded with freight in his day and that it's a mighty important job. Uncle 'Taff' calls it getting her trim. Then he explains how heavy freight goes into the bottom holds, lighter stuff on top, how the ship must sit on an even keel, how the cargo must be secured so that it won't shift.

"All very interesting", says you, "but what's that got to do with my vee-hickle, it ain't no ship."

O.K.—you're not driving a ship, but loading ships and loading trucks have a lot in common. Overload a ship and she'll sit too low in the water—overload a truck and it will sit too close to the ground. In fact, immediately after the axle breaks, she'll sit right on the ground.

Improper distribution of the cargo on a ship may put her bow down or settle the stern, strain her plates and make her hard to steer and handle. On a truck it's a scuttling business too—overloads, bends frames, makes the truck hard to steer and maybe causes a blowout and a crackup.

There are at least fifty-seven varieties of reasons, from a mechanical standpoint, why proper loading and load distribution on a vehicle is extremely important.

The designers figured out the frame or chassis design to meet uniform load distribution with an ample factor of safety. But a poorly distributed load may use up that factor of safety and bend or twist the frame thereby making the designer a you-know-what.

A bad load distribution will overload springs, axles and bearings causing their premature failure, once again making the designers, the manufacturer and the workshop that "just renewed them blankety wheel bearings" all fugitives from the kindergarten.

Maybe all these things don't happen in one trip but from what we've noticed by long periods of watching the loads go by, it's a habit with some guys and it's the continued practice of poor loading technique that does the damage.

There's another kind of load, peculiar to the Army, that is worthy of mention—not because it's particularly hard on the vehicle so much as it's dangerous aspects. We mean a truck load of troops. Using a personnel carrier equipped with seats eases the problem somewhat but carrying a load of troops in an ordinary truck where they all stand, the better to see the passing scene (and stuff), is another story.

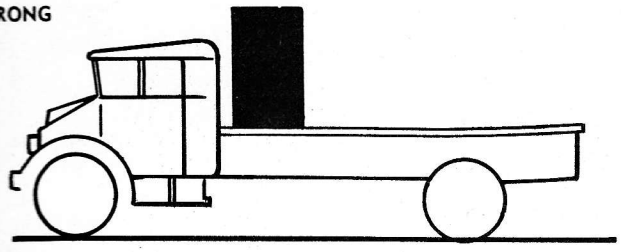
A driver with a load of troops on board, that swing and sway all the way, has got to watch his step—particularly his step on the gas. There's not much he can do about the actual loading as the boys will stand around the sides and hang on the rear tail gate anyway.

The weight of the load is loose—and every turn the truck makes sways the load in the opposite direction, producing a most unhealthy situation, that calls for the utmost in careful and cautious driving on the part of the driver.

A careful study of the old masters reproduced on the following pages will make things clear and show those guys who have been guilty of what our Uncle "Taff" calls "land lubber loading" the error of their ways.

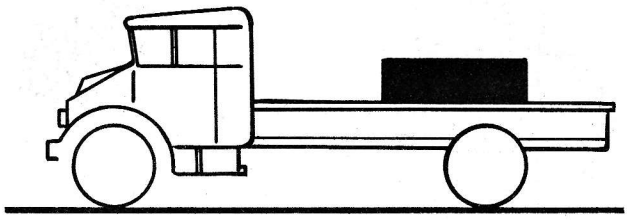
Based on an article in Products Review published by General Motors of Canada Ltd.

WRONG



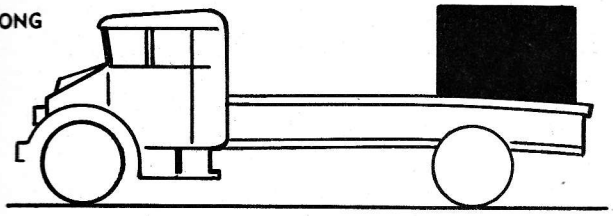
A heavy load, like a big piece of machinery, should not be loaded against the cab. This will bend the frame, perhaps permanently. It will also overload the front tires, may even cause a blowout on a worn tire and will certainly result in hard steering.

RIGHT



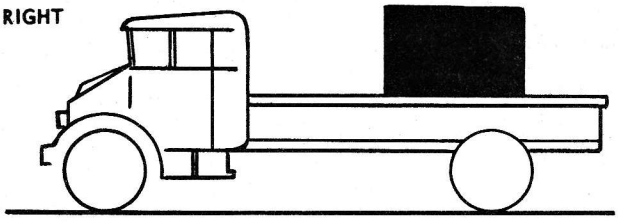
A heavy concentrated load should be placed near the rear and on its long side if at all possible. Most of the load should be over the rear axle to get proper loading and eliminate bending of the frame.

WRONG



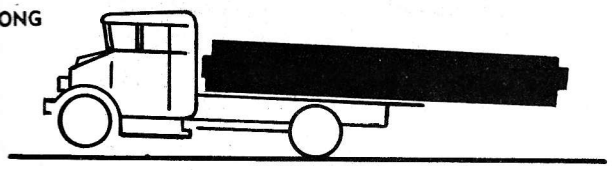
This load is as silly as it looks—but it has happened. The frame bends, the rear tires are very much overloaded and enough weight is taken from the front tires to make steering almost impossible.

RIGHT



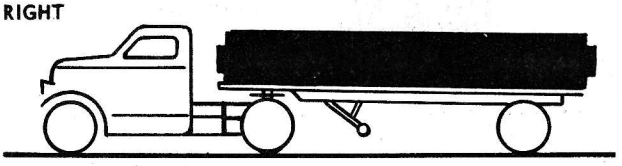
Again the proper place for a concentrated load like this is just ahead of the rear axle, with the longest side on the floor.

WRONG



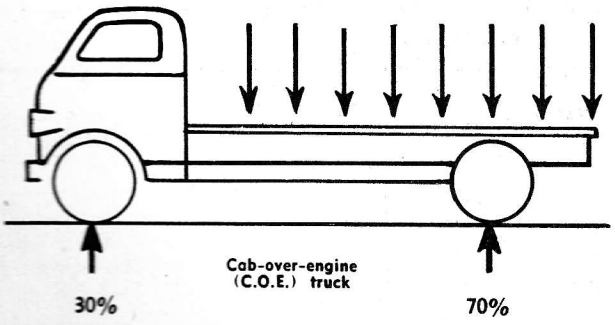
We hardly need to remind you that the front wheels are on the road only part of the time. Why go further—just don't load like this.

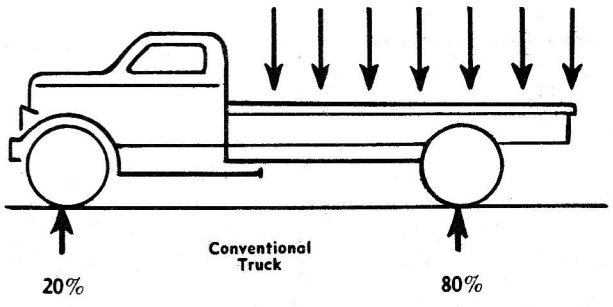
RIGHT



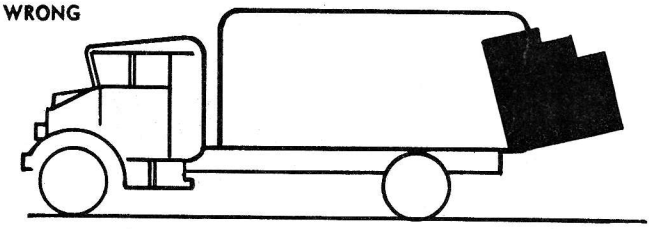
A tractor-trailer combination is the proper vehicle for loads like this. Don't try the wrong way for even one trip—You'll be sorry if you do.

As mentioned before, a truck is designed for a certain distribution of load, as shown in this diagram, to give a definite distribution of the gross vehicle weight on the tires.



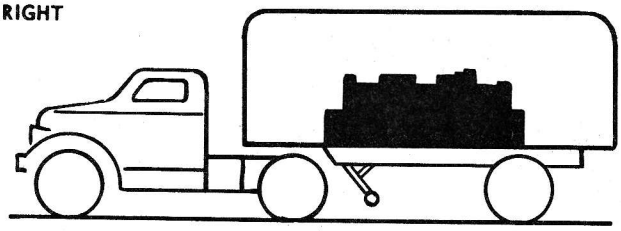


WRONG



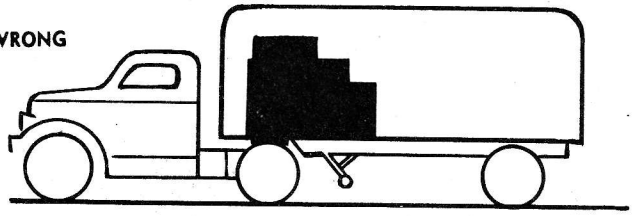
And then we have with us the tail gate loaders—this is a helluva way to carry overloads.

RIGHT



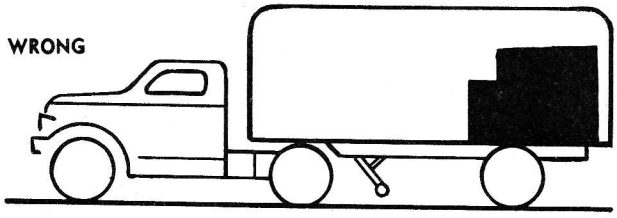
The load should be distributed over the full length of the trailer floor or platform.

WRONG



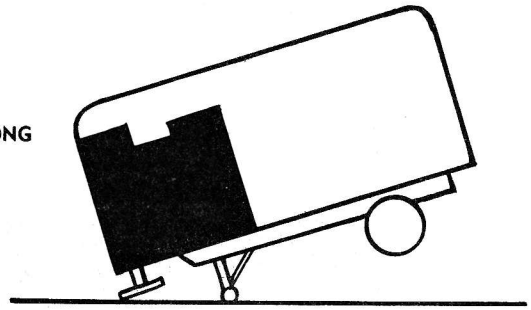
With a heavy load having little bulk it's common practice to put it at the front end of the trailer to get traction on the tractor rear tires. This overloads the truck tires, shortens their life and bends the rear axle housing. Application of trailer brakes may lock wheels, cause tire flat spots and/or skidding.

WRONG



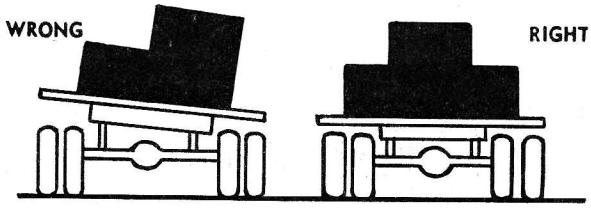
Here's a screwball loading—and the trailer tires are very much overloaded. There would not be any load on the fifth wheel in this case and the truck-tractor rear tires would certainly slip and wear away good rubber. Braking distribution would also be very bad.

WRONG

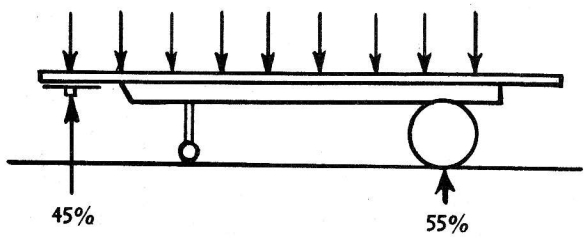


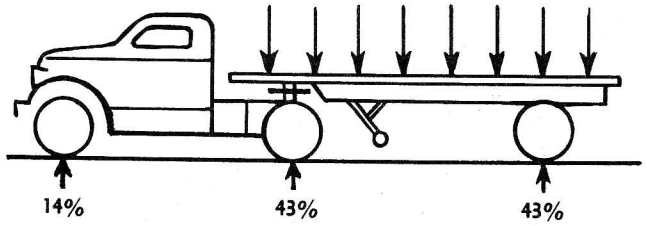
Don't pile heavy freight in the front end unless you have blocked up the trailer to prevent tipping. Serious accidents are caused by trailers "nose diving" because of this carelessness. This applies to both loading and unloading.

WRONG RIGHT



This one's easy—the wrong way puts flat spots on the underloaded tires, over loads the others and the springs, twists the frame and loosens rivets and brackets and plays hob with the axle housing and wheel bearings.

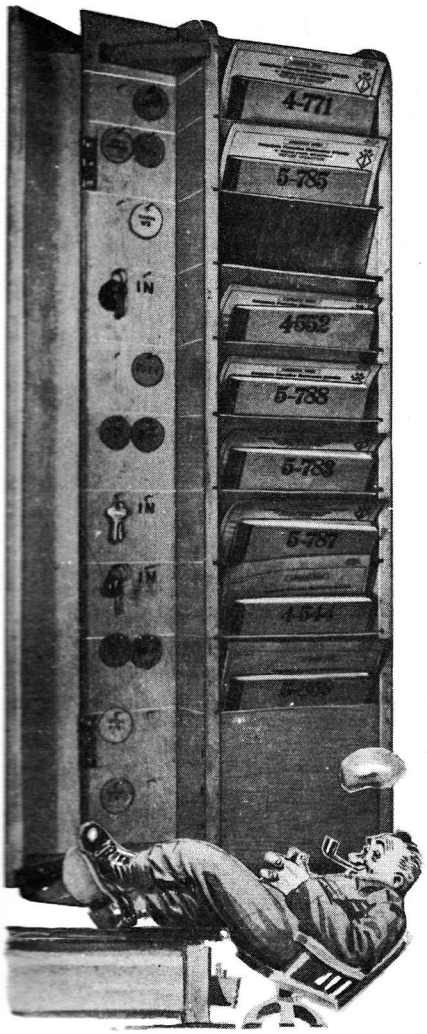


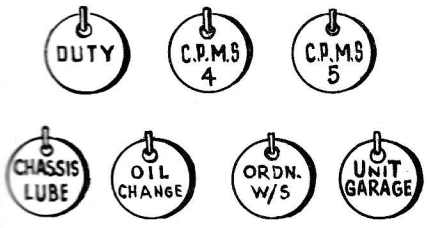


DISTRIBUTION OF WEIGHT—VEHICLE AND LOAD

Trailers are designed for uniform load distribution as shown by these sketches. Remember this fundamental difference between loading trailers and trucks: In the case of trucks, the average design provides for 80% to 90% of the load on the rear tires. In the case of trailers the load should be distributed equally between the rear tires and the fifth wheel, which transfers its load to the truck tractor

Control Racks

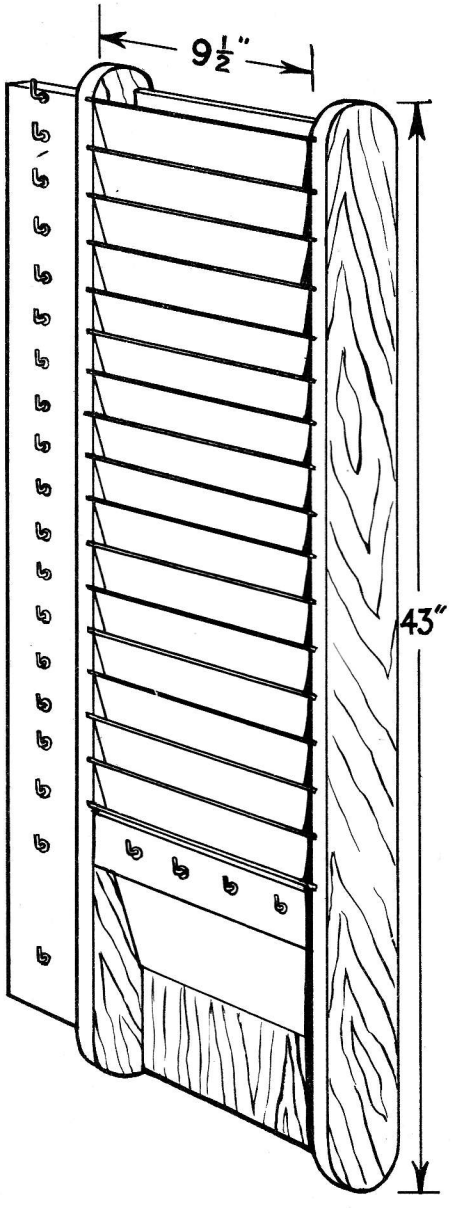




The dimensions are approximate—because there's usually a carpenter in the house and he will work them out to suit the material that's available. A couple of pointers though—allow an extra inch of space to hold a months supply of C.P.M.S. forms To get this amount of space the partitions on the deluxe job are 2¾" apart (measured on the face of the rack). You can make the tags any shape and of any suitable material—you're the boss—go to it.

This time its M.D. 13 that takes the gold plated dip stick for the contribution of the month.

Evidently the unit personnel and CWAC clerks of the No. 13 Ordnance Depot Technical Workshop Coy. at Calgary got tired of playing "eeny-meeny-miny-mo-who's-got-the-log-book-belonging-to-Joe" and idea'd the snappy log book "what-not" pictured here.



Standard economy size

A simple, sensible and sanitary set up for a satisfactory C.P.M.S. system we call it.

Known as control racks, they come in two models—the standard economy size as shown below, which is the easiest to make and fulfills the normal needs of practically all units and the Dipsy Doodle Deluxe Model which is **the** thing if you have commercial vehicles on charge—because the cupboard gives you a spot to retain keys and keep them locked up at night. Both of them can provide a system for

(1) Controlling vehicle movement
(2) Control of Lubrication
(3) Control of oil changes
(4) Controlling 1000 mile inspections (CPMS4)
(5) Controlling 5000 mile inspections (CPMS5)
(6) Filing system for log books
(7) Filing system for daily work tickets and CPMS check sheets.

You probably have more vehicles on charge than there are shelves in one of these racks—o.k. add another rack—maybe you need a battery of them—they still work.

You'll notice the log books have been numbered very neatly and plainly—well, they weren't done by Rembrandt, but by borrowing the standard numbering set from Spare Parts.

We hear that this idea has gone over big in M.D.13 and practically all units are equipping themselves with these working "what-nots"—which in our idea is the proof of a good pudding.

ſ ſ ſ

Spring Tonic for COOLING SYSTEMS

Don't get us wrong, we're not selling a tonic to banish cooling system cleaning now and forever more amen. Cooling systems collect dirt—even as you and I—and have to be cleaned seasonally (the cooling system, not you and I.)

What we're selling is a cleaner, a tested cleaner, and an inhibitor, that the Army liked so well they blessed it with a parts number. But most of all we're selling the program of care that goes with the cleaner.

Before ballyhooing our 'PM for cooling systems' plan—throw out those untested cleaners you've used in the past seasons—the 'Hallellujah Cooling System Tonics' . . . guaranteed to flush the system, peel off rust and scale, charge the battery, straighten the frame, grow hair on the baldest heads. Etc., etc. . . .'.

No more of that—requisition the new cleaner and inhibitor from Spare Parts (Radiator Flush 90147. Radiol Inhibitor 90198) and use it exclusively.

But now for our program of preventive maintenance of the cooling system.

Cleaning and Inhibiting may be a well-known program to some of you guys but don't rush away—we've been able to count on the knuckles of our left hand the number of guys who knew what the inhibitor was supposed to do. Even the easy part, the Cleaning, had a lot of the boys guessing.

So stick around everybody—and maybe we'll all learn something.

To make things clear, let's break the program up into three steps: Cleaning, Flushing and Inhibiting.

The first step is Cleaning: the idea here is to get as much of the slime, seaweed, rust and dust as possible out of the system, first by draining, second, by using the cleaner. The cleaner eats into and loosens the grease-bound rust, which is clinging to the walls of the cooling system, like the both of us would cling to Hedy Lamarr. Heat also helps loosen this corruption so we run the engine a while to get it up to operating temperature—placing a piece of cardboard or something in front of the radiator to prevent the fan pulling air over the cooling fins. The heat having loosened up some of the phooey in the system, we open the drain plugs, and let it drain off.

Whoa!—before we open all the drain plugs in the radiator and block, let's find a bucket and stick it under some convenient drain plugs, to catch the old coolant. There's a shortage this year—we're saving used Prestone (and other ethylene glycol coolants) for use next year (see article on page 103). Don't throw them away.

With the bucket in place, we take off the radiator cap and let atmospheric pressure help drain the system quick. If the drain holes are plugged with grime, get a hunk of wire and 'rod' them out.

Now that we've got the coolant and the loose slime out by the simple method of draining, let's coax the more pernickety dirt out by sending our cleaner in after it . . . like sending a snatchbound into a hole after a rabbit. The cleaner will loosen the dirt, rust, etc. in the system by dissolving the grease that's binding it.

Warning—don't put cold water into a hot engine—unless you want to crack it wide open. Let it cool off before proceeding with the cleaner.

With the drain plugs screwed in, carefully pour the cleaner into the radiator—and screw on the radiator cap.

Now start the engine and run it at a fast idle. Heat will make the

cleaner work better so get the engine temperature up to about 180° —cover the radiator if you have to, but don't let the mixture boil. Don't go joyriding in the truck with cleaner in the system and don't let the level in the radiator drop too low—otherwise the water pump has a hard job circulating the mixture in the system.

A half hour treatment ought to do the trick—shut off the engine and drain the system again, removing the radiator cap and opening **all** drain plugs. Let everything out.

Now, if everything has gone off according to schedule, all the muck that's gonna come out peaceable, has come out with the cleaner—for the rest, you'll have to take other measures or else crawl into the radiator yourself and drag it out by the hair. Personally we don't think you've got the build for it—at least we hope you have'nt.

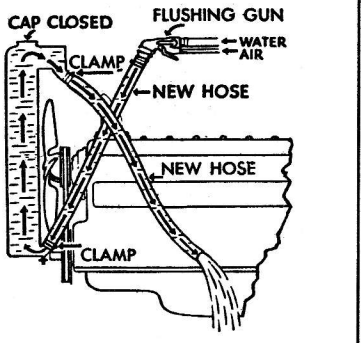
The next step is to clean up after the cleaner—because if we let it linger in the cooling system, it'll probably creep out by making its own holes. So we give 'er the old Reverse Flush, as follows:

Reverse Pressure-Flushing calls for the use of the flushing gun, (if there is'nt one available, we direct our gentle readers' attention to 'B' Vehicles Service Information Bulletin L-3 where complete and simple plans on how to whip up one of these hadny gimmicks is laid forth.) This will enable you to squirt air and water under pressure, at the corruption in the cooling system.

We use Reverse Flushing because all the slime and scale that's clinging to the walls of the cooling system is pointed in the direction of the normal flow of the water—like moss and weeds in a swift-flowing stream. If you reverse the current, all this stuff is uprooted and torn away. Also most of the grime is perched in the upper tank of the radiator and hanging down into the tubes. Bringing the water up from below, pushes the grime right out through the top hose outlet. Flushing in the direction of normal flow would push it down into the tubes—that's doing it the hard way.

We'll, pressure flush the radiator first, Remove the upper and lower hose connections between the block and the radiator. Root around and find two pieces of hose—one a couple of feet long; the other a couple of yards long. Attach the short piece to the lower hose connection of the radiator to take the flushing gun; attach the long piece to the upper hose connection to carry away the flushing stream.

Now clamp in the nozzle of the flushing gun, screw the radiator cap on tight, hold on to your hat and



Showing pressure flushing of radiator

Fig. 1

turn on the water: Let it run until the water flows out the upper hose—then turn on the air pressure a short blast at a time. **Go easy with the air,** according to how badly the radiator is clogged—it's not very hard to blow up the radiator.

Shut off the air after the water is blown out and let the radiator fill with water again. Shoot the air in again in short blasts.

Repeat the fushing until the water comes out the hose at the top of the radiator clear and in a full stream.

Next in line to get flushed are the water jackets in the engine.

Be sure to start out by removing the thermostat as you won't get anywhere with a closed thermostat plugging up the entrance to the water jackets. Clamp the flushing-gun nozzle firmly to the engine water outlet and turn on the water until the jackets are filled. (To be sure of a complete filling, partly close the opening where the flushing stream comes out.) Turn on the air pressure in short blasts to blow the water and the loose sediment out of the water jackets. Repeat this operation until the flushing stream runs clear.

Maybe the truck you're working on has a heater—being tied into the cooling system, it gets and traps some of the cooling system dirt. Flush it out separately just as you flushed out the radiator.

To wash out any dirt still floating around, pressure flush the system in the direction of normal flow.

After flushing and before connecting up the hose, there's a few little things you might do: Clean off the connections where the hose goes. Make sure hoses are in good condition and not mushy before replacing the thermostat and water outlet (use a new gasket here too). Clean out the overflow pipe which has probably had a lot of grime pushed into it; inspect and lubricate the water pump if necessary; check the thermostat and finally the fan belt tension.

Checking the thermostat is a simple matter that you probably know about but we'll mention it just for the sake of old times. You place thermostat in a can of water and gradually heat the water to opening temperature. Note by means of a thermometer the temperature at which the thermostat is fully open, it should jibe with the figure stamped on the end of it.

You might also blow the old insects out of the radiator air passages, grills and bug screens.

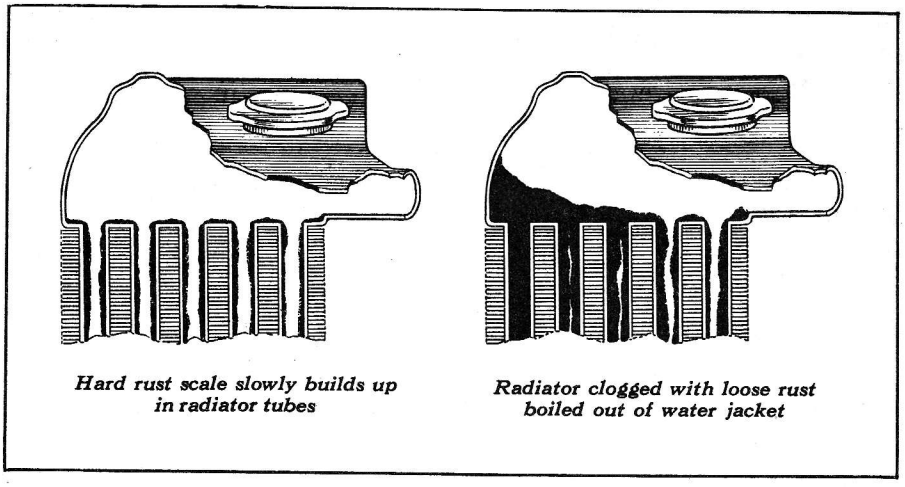
Offhand, you'd think that pressure flushing, next to hand cleaning or blasting with dynamite, is best for loosening rust, scale, etc., bound together with grease. But you're wrong

—the cleaner will sometimes do a job where pressure flushing won't. Flushing uses brute force in a frontal attack, and is most effective for sweeping away loose sludge. Cleaning uses fifth-column and infiltration tactices—it penetrates and bores out the grease that's binding the sludge, from within. Never pressure flush before you've used Cleaner.

Remember this too about Cleaner: it digs out all the rust and sludge that's stopping up the small leaks that occasionally develop in radiator seams. You ride along high and dry with the sludge and rust plugging these leaks—but in cleaning, this sludge and rust is swept out and you've got a radiator as full of holes as Hirohito's heiney is gonna be.

Repairing these leaks (in the radiator) is all part of the job of putting a cooling system in shape so don't pass up the opportunity of getting any leaks fixed right away.

The last step, Inhibiting, is the preventin'est step in the program. The Inhibitor prevents rust and corrosion forming in the cooling system. Keep corrosion and rust out and most of your troubles are over. The Inhibitor does its work by laying a protective film or coat over all the metal surfaces in the cooling system, and also by neutralizing the effect of the stuff that might enter the system with water that's poured in (except for dead leaves, sand, etc.)



Hard rust scale slowly builds up in radiator tubes

Radiator clogged with loose rust boiled out of water jacket

Before putting in the inhibitor, check the entire cooling system for leaks. Inhibitor leaking into other parts of the engine won't do it any good—not to mention that the inhibitor being weakened, the protection will be weakened.

Don't use "hard" water in the cooling system, if you can avoid it. By hard water, we don't mean ice. We mean water with impurities such as lime in it. Lime forms hard scale in the system and uses up the inhibitor in a hurry. Use "soft" water —like rain water.

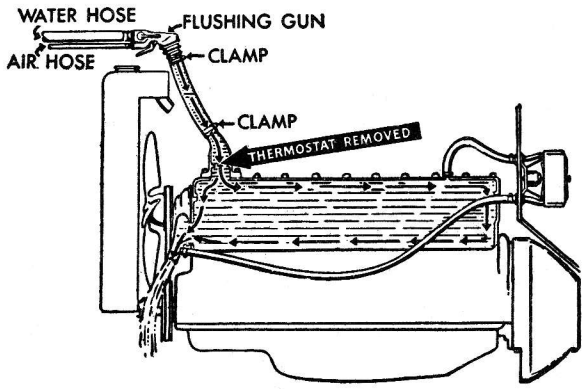
To install the inhibitor, drain the cooling system and fill it up to the top of the core with water—leave room for expansion and for inhibitor. Pour in 1 1/2 oz. of Radoil inhibitor for each gallon of water. Run the engine (radiator covered if necessary) up to operating temperature—finish filling the radiator with water but don't overfill or you'll lose inhibitor.

The inhibitor is good for six months —except if you've got to add a lot of water during that time. In that case, you'll probably have to drain the system and give it a new inhibitor treatment. Don't try to shortcut a shortage of inhibitor in the system by adding more than the specified amount. Too much inhibitor interferes with proper cooling.

Well, there you have it—that's all there is to our celebrated Preventive Maintenance for Cooling Systems program. Don't forget the job of blowing insects, dirt and old pedestrians out of the radiator air passages, grills and bug screens with an air hose—they block the flow of cooling air through the radiator and a radiator blocked up on the outside gives the same poor results as one that's blocked up on the inside.

Don't think that cleaning the cooling system always remedies overheating of the engine. A clogged system is only one of many possible causes of overheating. Look for collapsed hoses; stuck thermostats; cylinder head gasket leakage; air suction from the water pump; fan belt slippage; engine timing, carburetor adjustment; 'tight' brakes; etc.

(Continued on page 120)



Showing pressure flushing of engine block

Receiver Antenna Circuits

Shorty Sirkits' brief listing of the characteristics of various antenna circuits may enable us to understand the designer's choice of circuit for a specific application. Most of us have wondered why the "Slide rule Boys" chose the seemingly complicated circuit instead of a nice simple, straightforward R.F. transformer to couple the receiver antenna to the first tube. Shorty's explanation of the four basic circuits should give us some insight into the choice. We must remember that there are considerations other than electrical ones in the design of a receiver, ease of manufacture and expense being among the chief ones. In military transceivers and transmitter-receivers the fact that the receiver uses the same antenna as the transmitter must also be considered. Most of the antenna circuits we encounter will be one of the following or a combination of two of them.

The circuit usually found in Household Broadcast receivers is the High Impedance Primary Inductive coupling circuit, quite frequently combined with High Impedance Capacity coupling. In spite of its long name it consists of simply on R.F. transformer with rather loose coupling. The primary winding has a higher inductance than the secondary. Usually .75 to 1.5 Millihenry for the primary and from 230 to 260 microhenry for the secondary when used on the Broadcast band. The high Impedance of the primary gives the circuit its chief advantage. Since changes reflected through the transformer depend among other things on the turns ratio of the transformer, changes in the antenna itself will be minimized in their effect on the secondary tuning with this type of circuit. The circuit gives a fair amount of gain and has a good image rejection ratio. Because of the loose coupling and the high impedance of the primary, gain falls off at the higher frequencies. This is overcome to some extent by connecting a condenser of from 3 to 10 mmfd. from the antenna to the grid end of the secondary. This will work only when the current from the condenser is in the right direction to boost the secondary current.

The next type of circuit is the Low Impedance Primary Inductive coupling. This type is used almost exclusively on the short wave bands. It uses an R.F. transformer with a low impedance primary tightly coupled to the secondary and because of this is capable of high gain. It also reflects antenna changes much more easily than the High Impedance Primary type and antenna adjustments are critical. This Circuit gives increased gain at the high frequency end of the band and therefore has a poor inmage rejection ratio.

High Impedance Capacity coupling uses a single coil instead of a transformer and feeds the signal from the antenna through a condenser of from 3 to 10 mmfd. to the high side of the coil. This type of circuit has poor image rejection characteristics and is used only where simplicity is desired. It is sometimes used in conjunction with High Impedance Inductive coupling to increase the gain at the high frequency end of the band.

Low Impedance Capacity coupling is used for installations such as car radios where long shielded lead-ins are necessary. The signal is fed from the antenna through a high capacity (.001 to .003 mfd.) condenser to ground. The low side of the grid coil is connected to the junction of the condenser and antenna. The signal current develops a voltage across this condenser which is amplified by the tuned circuit and applied to the grid. A D.C. path, consisting of a high resistance must be provided from grid to ground. The capacity between lead-in and shield which would normally cause losses can be used as part of the coupling capacity and increase efficiency. The chief disadvantge of this type of circuit is the fact that where an R.F. amplifier is used the tuning condenser of the following stage must be a different size, or must have a capacity equal to the antenna coupling capacity, in series with it, for tracking purposes. Hum frequencies picked up by the antenna can be bypassed to ground from the antenna through an R.F. choke.

You should now have an inkling of why a certain circuit is used if you remember the other considerations mentioned in the opening paragraph. It may not help in servicing them but it's good to know why.

JOE'S JOINT

There's a fellow we know (we'll call the guy Joe)
Who was always soldering a joint;
BUT the solder he used could only be fused
With an iron, red hot at the point.

The joints that he made were dirty,
(Poor Joe had never been told).
So he tried out some acid-core solder;
Resin-core just wouldn't hold.

The sets he repaired would run for awhile,
But soon they would sputter and die;
For acid you know, conducts current like snow
And the leakage is dreadfully high.

But we're glad to advise that the Sarge put him wise
And has shown him that grime doesn't pay,
Now he's cookin' with resin—which is provin' a blessin'
With trades pay at six bits a day!

SARGE O'SWEAT GOES OVER HIS NOTES ON

Files

Sarge O'Sweat noted an unusual change had overcome Pte. Halftrack. He switched reading dime comic books. Lately he's been nosing into a volume "How to Become an Expert Mechanic". Sympathetically, Sarge O'Sweat looked on—then wondered whether he could help out in some way while Halftrack was in a learnin' mood. Remembering some lecture notes he had saved, he rummaged through his tool chest. His eyes lighted on a little black note-book. Leafing through the greasy pages he came across notes on "The Use and Care of Files. Hmmm— "Pte. Halftracks", here's some swell dope on files. "I'll read 'em to you 'cause you'll never be able to read my writin'. It says here in my book, CAM—Gal. THIRTEEN

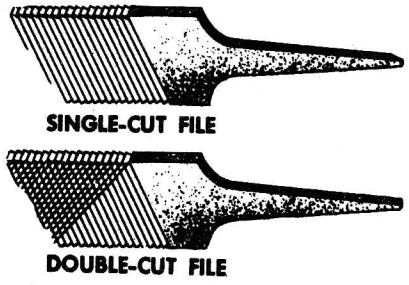
every file you use should be equipped with a tight fitting handle. It is dangerous to use a file without a handle. Often the end of the tang is quite sharp and if you are using a file without a handle and the file meets an obstruction and is suddenly stopped, the pressure of your hand against the end of the tang may result in a bad cut."

Sarge turned to another page. "Ahh, here's the correct way to put a handle on a file.. First make sure the handle is the right size and that the hole is large enough for the tang. Insert the tang of the file into the hole of the handle, then tap the back end of the handle on the bench or a flat surface on the vise. Make sure the handle is on straight.

". . . . wish this page was'nt so smeared", mused Sarge O'Sweat, 'Oh well, here's something, Pte. Halftrack" "Whenever possible, the part to be filed should be clamped rigidly in a vise. To prevent rough vise jaws from damaging finished surfaces, use copper caps or some other soft material.

The sergeant leafed through a few more greasy pages until he came to one with a short note on it. He screwed his eyes up to the page. ". . . kinda hard to make it out, page is spotty with grease—umm, we'll let it go. . . ."

"Oh well, here's something of interest. In using a file, remember that the teeth are made to cut in one direction only. When the file is being pushed forward, all pressure of the file against the work should be relieved on the back stroke. Holding a file against the work on the back stroke serves only to help dull the cutting edges of the teeth. The preferred method of using a file is to raise it off the work before drawing it back. Files stay sharp longer when used that way."



"Halftrack, a mechanic who drags a file on the back stroke, I calls a shuffler. It's like a guy who is too lazy to pick up his feet when he walks."

Sarge read on. "There are exceptions to this rule however. When draw filing for example, the file rests on the work at all times. The file is pushed across the work crosswise and very little metal is removed. Draw-filing is a finishing up operation when filing an accurate flat surface."

"Doggone", he said, glancing back at the spotty page again, "sure wish I could make out what this writin' says". By this time Halftrack was all ears. He was beginning to wonder what-the-samhill was marked on that greasy page.

The sergeant kept rattling on.

"Beginners frequently have difficulty in knowing how much pressure to use on a file. They usually are told to "bear down" on the file without being told that using too much pressure is almost as bad as using too little pressure. The point to remember is to USE ONLY SUFFICIENT PRESSURE TO KEEP THE FILE CUTTING. Different metals and different files call for a difference in the amount of pressure you should apply to the file."

"Never use a file after the teeth become "choked" or clogged with particles of metal. The experienced

filer will bump the tip of the file or the end of the handle on the bench every now and then while filing to jar loose the filings which stick in the teeth. This won't always get all the chips out though, so the thing to do when the file gets "loaded" is to clear the teeth with a file card. This is a brush with short, stiff wire bristles. If there are any chips remaining after using the file card, these should be dug out with a pointed or flattened cleaning wire called a "scorer". Usually a file card has a scorer attached to the handle."

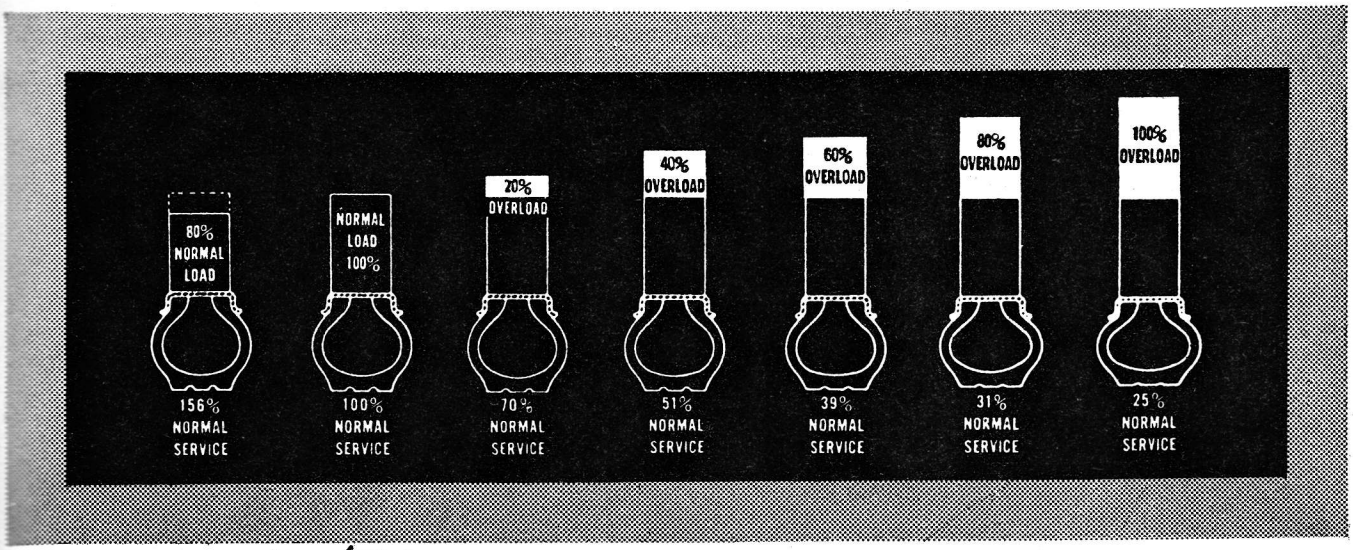
"Files must be sharp to do their best work. Metals which are soft and tough, such as copper and some of the brass alloys, require the use of very sharp files."

"To keep files sharp, see that their surfaces are protected when not in use. The best way to protect files in the shop is to hang them in a rack which has a series of slots. Files which are carried in a tool box should be wrapped in cloth, paper or other material which will protect them from other tools. Don't throw files around on a bench or into a drawer with other tools and expect them to stay sharp. Keep files away from moisture and water to prevent rusting."

"Never use a file for prying. The tang end is soft and bends easily. The body of the file is hard and very brittle. A light bending force will snap it in two."

"A final and very important precaution is never hammer a file This is positively dangerous because it may shatter with chips flying in every direction."

"Shucks", Sarge O'Sweat muttered, leafing back to that grease spotted page. "Wish I could make out what this note says." "Here", he passed the notebook over to Pte. Halftrack, see if you can make out what it says." Halftrack squinted his eyes at the dirty page and blinked. "Ahem", he cleared his throat and started to read—"umm"—Fifi—3-7809—and if a man answers, hang up".



Load effect on tires—

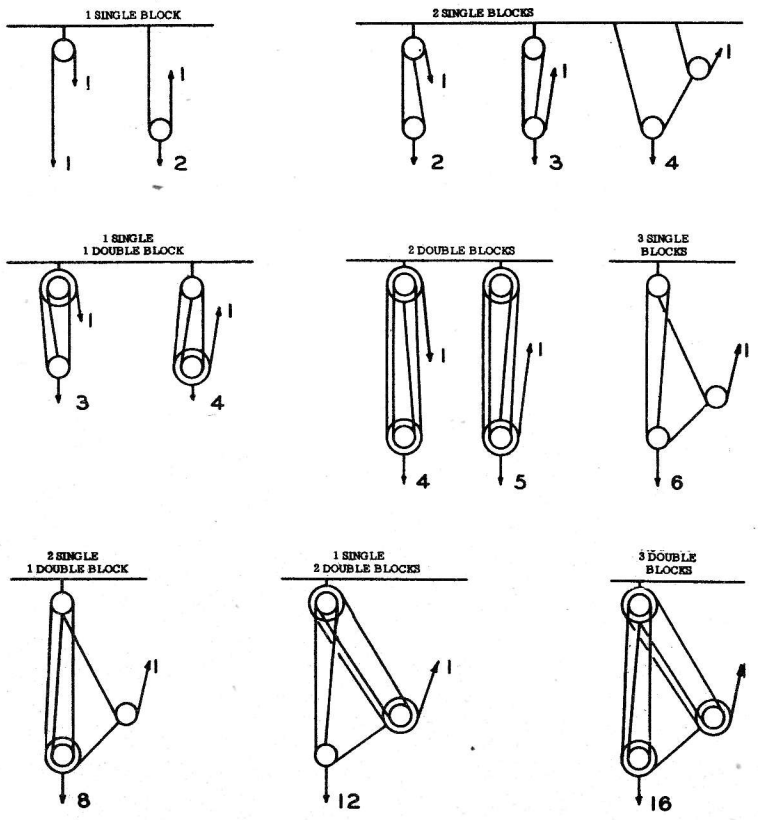
What happens when you overload a tire is all bad. Here's a snap we took in a blackout that shows the facts—in figures that should cause you to stop, look and remember before piling on that extra case of empties.

TACKLE RIGGINGS

Some ancient mathematician once stated that if he had the proper lever he could move the earth.

On paper this is possible and is simply the application of a factor known as Mechanical Advantage. Mechanical Advantage is just what it says—that is, if a lever or tackle rig is said to have a mechanical advantage of 4 that means that a 1 lb. force will raise a 4 lb. weight—or four times its own weight. You get (among other things) a mechanical advantage when you use a bottle opener. On your vehicle you get a mechanical advantage when you use the gear shift lever. The light force you apply at the top of the lever is a much stronger force at the shifter forks—one reason why a heavy handed gent can do so much harm to a transmission. When you shift into low gear the engine gets a mechanical advantage over the rear wheels by means of the leverage applied through the gears.

If you're with a recovery section or in a workshop, a common means of obtaining a mechanical advantage is the block and tackle. Here are a variety of rigs that provide a mechanical advantage for any moving or lifting job you're ever likely to meet.



A rule to remember: When fall line (that's the line you're applying your pull to) moves in the same direction as the load, it helps support the load and increases the mechanical advantage.

COOLING SYSTEM—

(Continued from page 116)

Another thing for the workshop end of the business—don't figure on cleaning the cooling system last, when you're on a rebuild or overhaul job. An engine that's left standing around without water in it, allows the rust to dry out. If there's anything harder to get out than dry rust, we have'nt seen it. So before grinding valves, removing carbon or rebuilding engines, clean the cooling system before the engine's pulled down.

In every case, when you've finished cleaning the cooling system, get that Inhibitor in there—it's like a shot-in-the-arm against diseases of the cooling system.

By the way, don't use this Inhibitor in anti-freeze—the R.C.A.S.C. take care of that like we tell you on page 103. If the Drivers are careful about the water they put into the radiator and keep an eye out for hose leaks . . . And . . . if the unit mechanics take our 'Preventive Maintenance for Cooling Systems' program to heart and carry it out faithfully every spring and fall . . . Why then, the clogged cooling system business for the workshops will drop off like Hitler's head when we get to him.

And we're sure the workshops won't be sorry.

We won't.

A SHORT SHORT STORY

'INJURY", said the soldier.

"INATTENTION", said the sergeant.

"INFLAMATION", said the M.O.

"INCURABLE", said the hospital.

"INCREDIBLE", said the mourners.

"INTERRED", said the undertaker.

"IN PEACE", said the tombstone.

Semi-Annual INDEX to CAM

VOLUME 1 — OCTOBER 1943 THROUGH MARCH 1944

The following index lists all the subjects covered by CAM from October 1943 to March 1944 inclusive.

The index is broken down by "B" Vehicles, "A" Vehicles, Motorcycles, Armaments, Telecommunications and Miscellaneous.

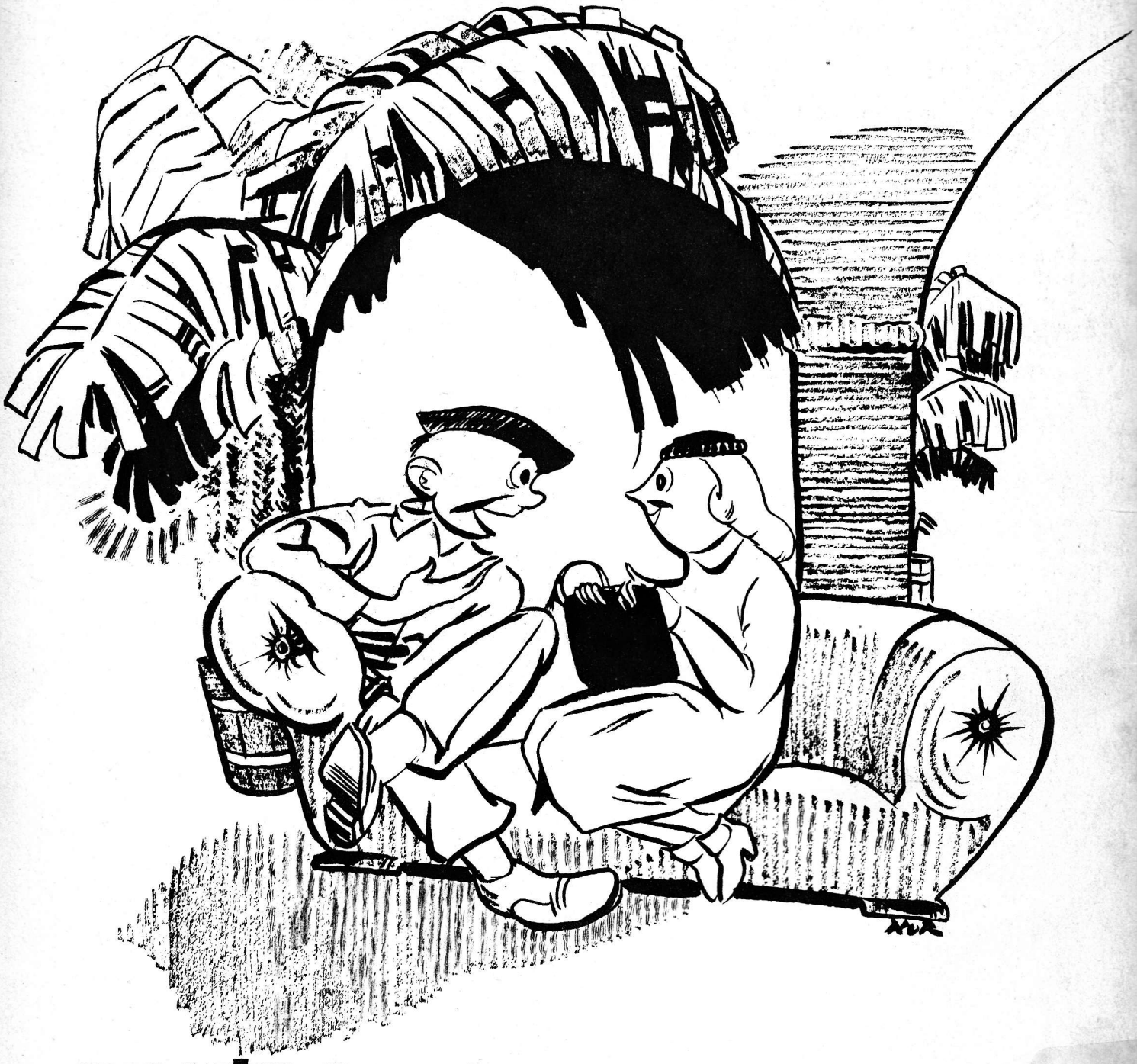
The headings are broken down into major assemblies, and other convenient classifications like Trouble Shooting, Procurement, etc. All the subjects big and small that have appeared in CAM over the past six months, are listed under these headings in alphabetical order.

CAM page numbers start with "1" at the beginning of the publication year and run through the six issues to page "100"

Covers are listed like this. . . .

IF—Inside Front—Cover
IB—Inside Back—Cover
OB—Outside Back—Cover

The number following a "B" or "F" shows what issue is referred to. The October issue being "Number 1", OB1 means "Outside Back Cover, October Issue.



DON'T BE A *Blabateur*